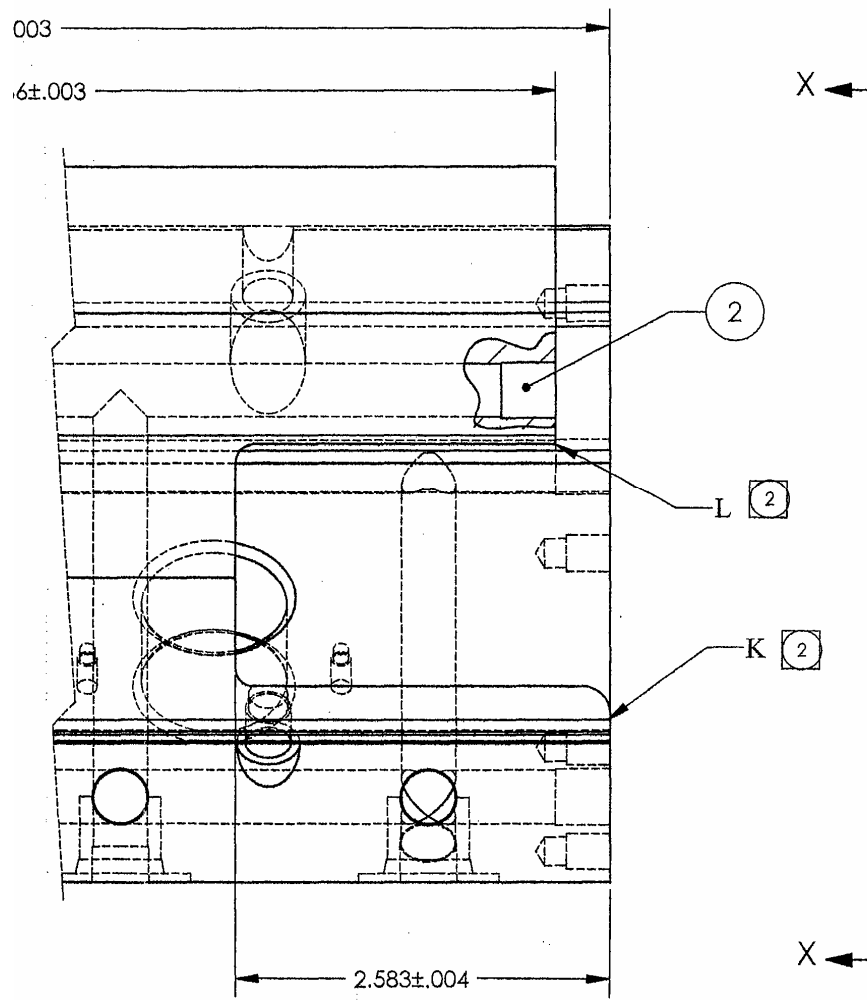


Status of RFQ tuning

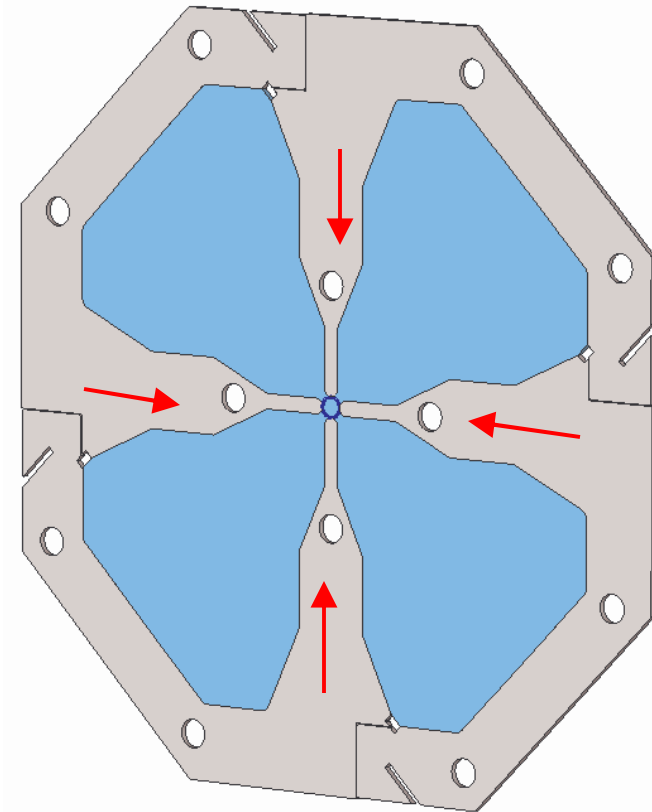
Gennady Romanov

May 15, 2008

Machining and bore diameter changes to the vanes are completed

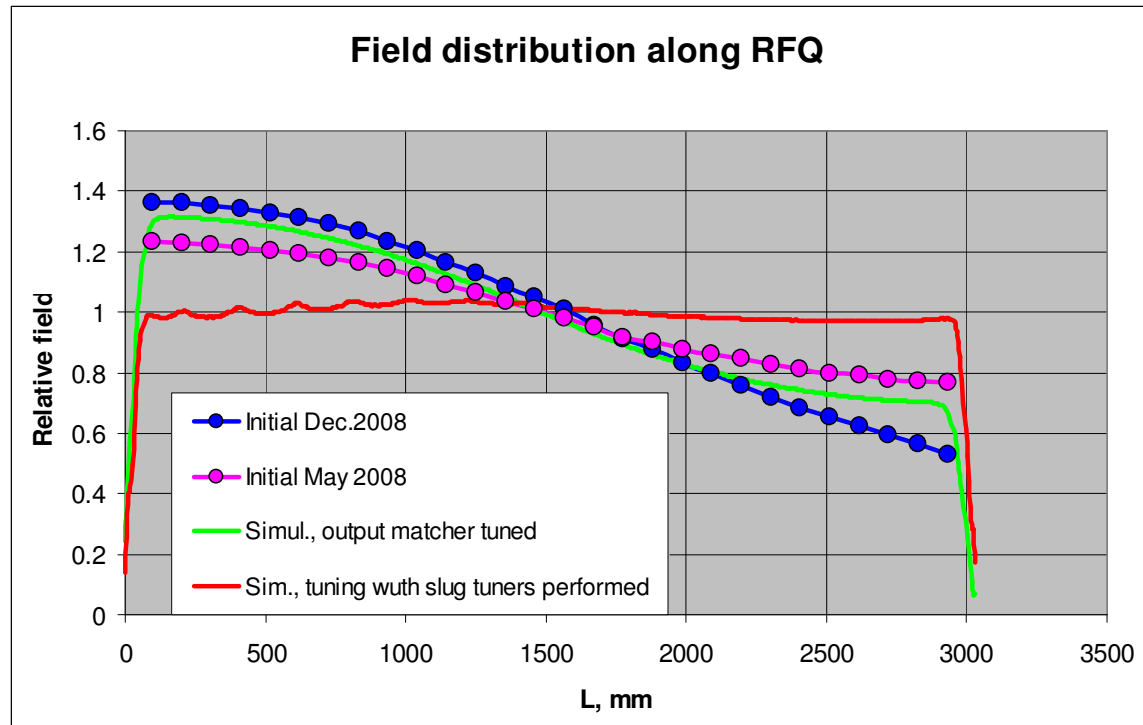


Actual average cut-off depth is 2.5811



Request was 50 microns reduction
of median bore radius.
Actual average reduction
is 61 microns

Results



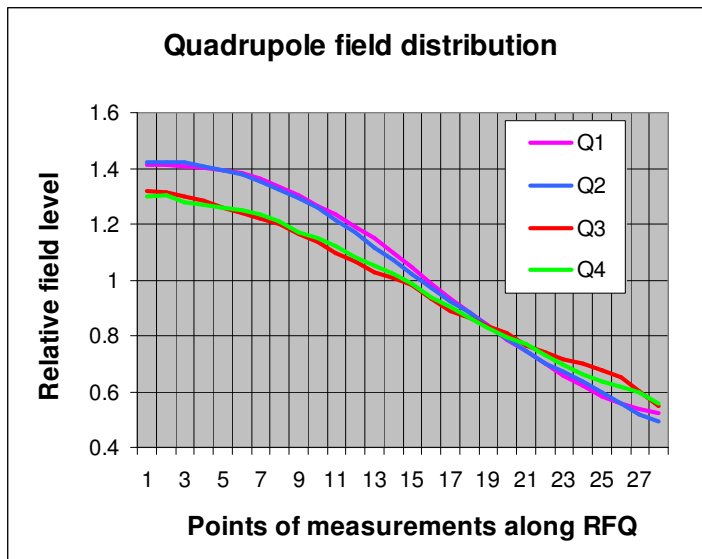
Tuner	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Penetration,mm	20	20	20	20	16	12	8	8	4	4	0	0	0	0	0	0

Field distribution is a little bit better than simulated.

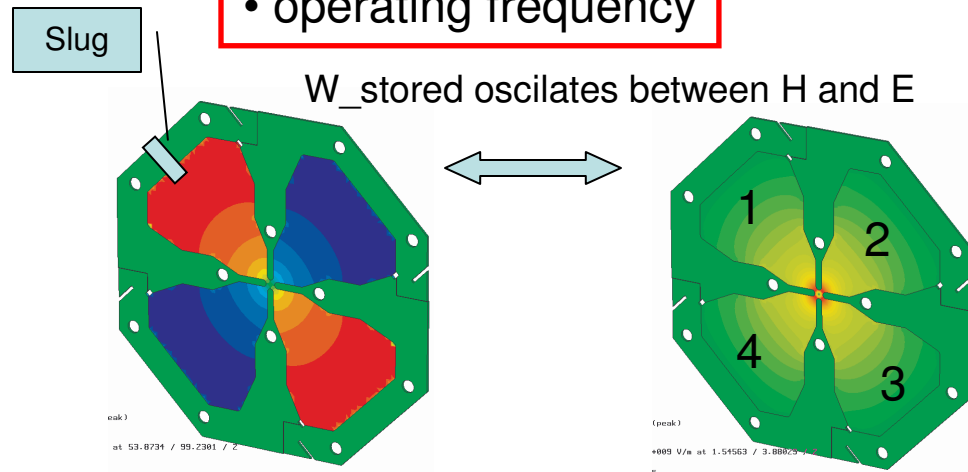
Frequency is 323.639 MHz, target was 323.5 MHz. Not a big deal:

- May be slug protrusions will be smaller because of better initial tilt
- If not, differential cooling can do the job

Several words about further tuning



- longitudinal flatness
- axial symmetry
- operating frequency



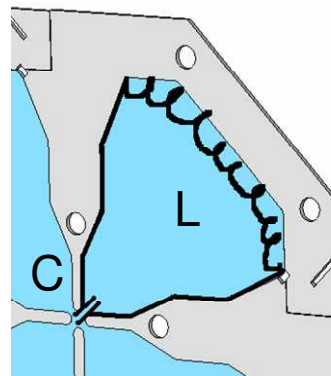
Relations for axial symmetry

$$\bar{E}_1 - \bar{E}_2 + \bar{E}_3 - \bar{E}_4 \approx 0,$$

$$\frac{\Delta E_1}{E_1} \approx -\frac{\Delta E_3}{E_3},$$

$$\frac{\Delta E_2}{E_2} \approx -\frac{\Delta E_4}{E_4}$$

Voltage in gaps ~ magnetic flux. Slug tuners reduce flux (field x area) and reduce E in the gaps by that.



$C = \text{const}$, L decreases.

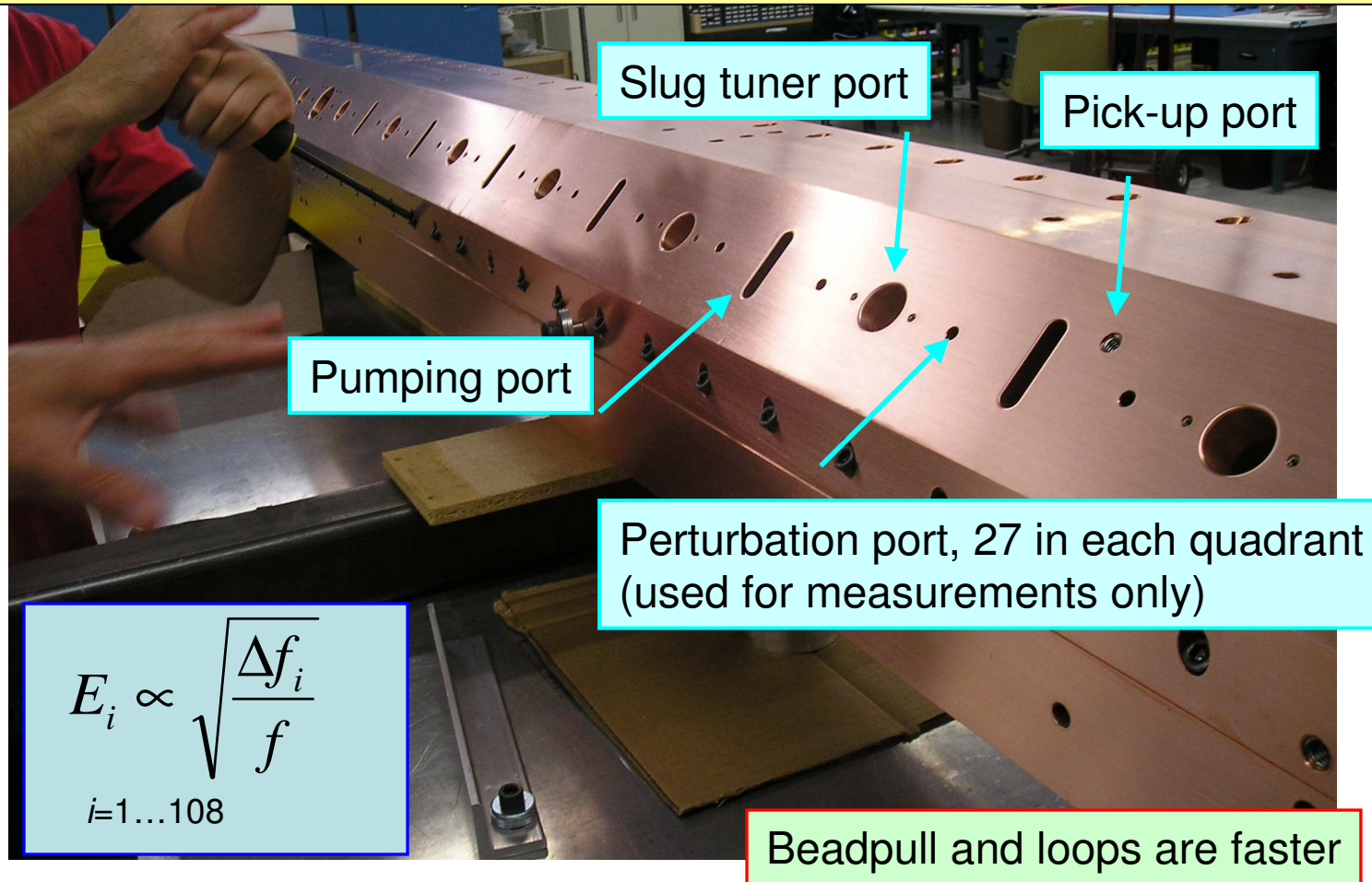
Local frequency

$$f = 1/\sqrt{LC}$$

increases.

The most time consuming operation is field distribution measurement

“In the early stages of tuning a resonator, each move requires approximately 2 to 3 hours. As we get closer to the final tuning of the resonator, a correction made to the tuning slugs might require 6 to 8 hours.”



The latest from AccSys (e-mail from May 13)

Gregg,

Steven e-mailed me his tuning effort/progress report for today. The resonator tuning was not what Steven or I had hoped for. I spoke with Steven this morning and we are in agreement that the beadpull should happen on the **28th** of this month. AccSys' original estimate for the beadpull was the 22nd of this month; we are 4 days behind our schedule right now. I do not see the schedule slipping any more.

Summary: As an update, the "big move" didn't work (?). It got me less than a third of the way to my target frequency (?). Clearly, my usual value for frequency moved per mil (?) doesn't work on this resonator. After calculating a new factor based on these results, it seems I still need to drive in all (?) the slugs another 4.75 to 5 turns each. A lot of work remains ahead of us.

Comment: At least they don't say that they cannot tune the resonator.

AccSys plan:

- Complete rough tuning and set resonator frequency.
- Preliminary install and check of drive loops.
- Final installation of the pickup loops must be complete before the resonator is installed into the chamber.
- Complete final tuning.